

## CLAIMS

What is claimed is:

1. A water heater, comprising:
  - a water tank;
  - a water inlet to introduce cold water into the tank;
  - a water outlet to remove hot water from the tank;
  - a heating element; and
  - a temperature sensor assembly adapted to sense a temperature of the water within the tank and coupled to the exterior surface of the tank, the temperature sensor assembly comprising
    - a non-planar base at least partially defining a volume,
    - a sensor disposed within the volume,
    - a collector coupled to the base and coupled to the water tank, and
    - a reflector coupled to the base.
2. A water heater as set forth in claim 1, wherein the water tank has a characteristic, and wherein the characteristic is one of the tank diameter or the capacity of the tank, and wherein the position of the temperature sensor assembly on the exterior surface of the tank depends on the tank characteristic.
3. A water heater as set forth in claim 1, wherein the non-planar base is arcuate.
4. A water heater as set forth in claim 1, wherein the base comprises a thermally conductive material.
5. A water heater as set forth in claim 1, wherein the sensor includes an NTC thermistor.
6. A water heater as set forth in claim 1, wherein the collector includes a copper foil disk.
7. A water heater as set forth in claim 1, wherein the collector is insulated.

8. A water heater as set forth in claim 1, wherein the reflector comprises a highly reflective material.
9. A water heater as set forth in claim 8, wherein the highly reflective material comprises aluminum foil.
10. A water heater as set forth in claim 1, wherein the reflector is parabolic in shape, and wherein the sensor is placed at the focal point of the reflector.
11. A water heater as set forth in claim 1, wherein the reflector is insulated.
12. A water heater as set forth in claim 1, further comprising a controller in communication with the heating element and the temperature sensor, the controller operable to receive the sensed temperature from the temperature sensor and to generate a signal activating the heating element in response to the sensed temperature.
13. A water heater as set forth in claim 1, wherein the base includes a first surface and a second surface such that the collector is coupled to the first surface of the base and the reflector is coupled to the second surface of the base.

14. A temperature sensor assembly comprising:
  - a non-planar base at least partially defining a volume;
  - a sensor disposed within the volume;
  - a collector coupled to the base; and
  - a reflector coupled to the base, the reflector mounted such that the sensor and the reflector are not in thermal contact.
15. The temperature sensor assembly of claim 14, wherein the sensor includes an NTC thermistor.
16. The temperature sensor assembly of claim 14, wherein the non-planar base is arcuate.
17. The temperature sensor assembly of claim 14, wherein the base comprises thermally conductive material.
18. The temperature sensor assembly of claim 14 wherein the collector includes a copper foil disk.
19. The temperature sensor assembly of claim 14 wherein the collector is insulated.
20. The temperature sensor assembly of claim 14 wherein the reflector comprises a highly reflective material.
21. The temperature sensor assembly of claim 20 wherein highly reflective material comprises aluminum foil.
22. The temperature sensor assembly of claim 14, wherein the reflector is parabolic in shape, and wherein the sensor is placed at the focal point of the insulated reflector.
23. The temperature sensor assembly of claim 14, wherein the reflector is insulated.

24. The temperature sensor assembly of claim 14, wherein the sensor assembly is configured for use with a water heater having a water tank, and wherein the sensor assembly is coupled to the exterior of the water tank.

25. A temperature sensor assembly for sensing radiant heat, the sensor assembly comprising:
- a thermally conductive arcuate base at least partially defining a volume;
  - a sensor disposed within the volume;
  - a copper foil collector coupled to the base, the collector being insulated; and
  - a parabolic reflector comprised of highly reflective material, the parabolic reflector being coupled to the base and being mounted such that the sensor and the reflector are not in thermal contact.
26. The temperature sensor assembly of claim 25, wherein the sensor includes an NTC thermistor.
27. The temperature sensor assembly of claim 25, wherein the sensor is placed at the focal point of the reflector.
28. The temperature sensor assembly of claim 25, wherein the reflector is insulated.
29. The temperature sensor assembly of claim 25, wherein the sensor assembly is configured for use with a water heater having a water tank, and wherein the sensor assembly is coupled to the exterior of the water tank.
30. The temperature sensor assembly of claim 25, wherein the base includes a first surface and a second surface such that the copper foil collector is coupled to the first surface and the parabolic reflector is coupled to the second surface.
31. The temperature sensor assembly of claim 30, wherein the base has only first and second surfaces.

32. A method of sensing a temperature of a fluid in a water heater having a water tank, the method comprising:
- determining a thermal profile of the water tank;
  - coupling a sensor having a sampling area to the exterior surface of the water tank in the water heater, the position of the sensor on the exterior surface being determined by the thermal profile of the tank; and
  - sensing the temperature of the fluid in the water heater with the sensor by measuring the radiant heat of the water tank.
33. The method of claim 32, wherein determining the thermal profile of the tank includes determining the average fluid temperature within the tank.
34. The method of claim 32, further comprising configuring the sensor to increase the sampling area of the sensor, thereby increasing the accuracy of the temperature sensing capacity of the sensor.
35. The method of claim 34, wherein configuring the sensor to increase the sampling area of the sensor includes providing a parabolic reflector coupled to the sensor to both increase the sampling area and to focus the radiant heat on the sensor.